

# PATENT SPECIFICATION

934,531

DRAWINGS ATTACHED.

934,531



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## COMPLETE SPECIFICATION.

### Improvements in or relating to Plug Valves.

I, BERNARD HENRY REFSOM, a British Subject, of 68 Dedmere Road, Marlow, Buckinghamshire, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to plug valves, the object being to provide improvements therein. It is particularly intended for application to such apparatus for use in laboratory equipment.

It is known to make such apparatus from glass and to provide a sealing interface by grinding the bore of the valve body and the surface of the plug located therein and greasing the ground surfaces to provide a seal therebetween and to lubricate them so that the valve may be operated without undue force.

I have found that using a material that has some elasticity and that is capable of permitting relative movement of contacting parts without lubrication by virtue of its low coefficient of friction, it is possible to provide a more efficient interface sealing between the plug and the valve body. An example of a suitable material for this purpose is polytetrafluoroethylene, hereinafter referred to as P.T.F.E.

According to my invention I provide a plug valve in which one of the surfaces comprising the interface of the plug and the valve body is provided with a lattice patterned reticulation formed by a series of raised intersecting edges leaving closed depressions between said edges, the reticulation pattern being such that there is at least one said closed depression in any route on said interface for the passage of fluid between any two ports in the plug and/or in the valve body when the valve is in the

closed position, and between any said port and an effective axial end of the said interface in all circumstances.

Some embodiments of my invention will now be described with reference to the accompanying drawings:—

Fig. 1 is a partly sectioned elevation of a valve according to one embodiment of my invention; and

Fig. 2 is a partly sectioned scrap elevation of a valve showing a plug according to a second embodiment of my invention.

Referring to the drawings, Fig. 1 shows a P.T.F.E. valve plug 2 with a through-port 4 seated within a glass valve body 6 with ports 8, the latter being connectable within a fluid pipeline. The plug 2 is secured in the valve body by a cylindrical threaded portion 10 engaging a cap 9 screwed thereon, the cap bearing against the body 6 through a rubber washer 12 and a P.T.F.E. washer 13. On top of a frusto-conical portion 14 of the plug and projecting above the through-port 4 is a square spigot 16 to which a handle or knob (not shown) may be attached for operation of the valve. The frusto-conical portion 14 is provided with a series of raised intersecting edges 15 forming a lattice pattern and thus leaving a pattern of depressions 17 in its surface. Such reticulation may be made by rolling a knurling tool having diamond shaped or otherwise suitably shaped figures on its surface over the conical portion 14 whereby these figures produce depressions in the surface of the plug and leave raised edges thereon which are uninterrupted throughout their lengths.

Thereby, a reticulation pattern is provided in which there is at least one closed depression 17 in any route for the passage of fluid on the interface of the plug and the valve

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body between any two ports in the plug and/or in the valve body when the valve is in the closed position, and between any said port and the axial ends of the interface in all circumstances.

By using a plug of this form in a valve, the actual bearing area between the plug and the body is considerably reduced. A given amount of tightening force applied between the plug and the body is considerably more effective in producing a fluid-tight seal than it would be in a valve in which the interface of plug and body is smooth and in which there is a considerably larger area of contact between the plug and the body. The top surfaces of the edges on the conical portion of the plug provide the actual contact area with the body.

Whereas Fig. 1 shows a lattice having a pitch which is small relative to the interface bores and axial length so that a number of sealing edges are interposed between any two points to be isolated from each other, Fig. 2 shows a modification of this arrangement wherein a plug 2<sup>11</sup> has only a medial portion 22 making a sealing fit in a valve body 6<sup>11</sup>. Adjacent the medial portion 22 are upper and lower grooves or channels 24 substantially reduced relative to the medial portion 22. At the upper and lower extremes of the plug there are upper and lower annular ribs 26 whose diameters are greater than those of the cone including the bands 24 and less than that of the interface of the valve body 6<sup>11</sup>. The annular portion 22 is provided with a lattice pattern on its surface similar to that in the embodiment of Fig. 1, an essential feature determining the width of the portion 22 being that at least one depression (17 in Fig. 1) is included in any route for the passage of fluid on the interface of the plug and the valve body between any two ports in the plug and/or in the valve body, and between any said port and the axial ends of the portion 22 in all circumstances, in order that the apparatus may be made to provide an effective seal. For example, at least one

complete annulus of diamond shaped raised intersections is disposed each above and below the level of the through-port in the plug. 50

It is to be understood that either the plug or the body of a valve according to my invention, or both, is made of P.T.F.E. or some other suitable material having the properties described hereinbefore, and that to obtain a sealing interface the reticulation may be provided on the surface of either the plug or the body. 55

#### WHAT I CLAIM IS:—

1. Plug valve in which one of the surfaces comprising the interface of the plug and the valve body is provided with a lattice patterned reticulation formed by a series of raised intersecting edges leaving closed depressions between said edges, the reticulation pattern being such that there is at least one said closed depression in any route on said interface for the passage of fluid between any two ports in the plug and/or in the valve body when the valve is in the closed position, and between any said port and an effective axial end of the said interface in all circumstances. 60

2. Plug valve according to Claim 1, wherein the sealing interface is confined to the medial portion between two transverse planes located a short distance above and below the level of the valve body ports and there are provided annular guide ribs at or near the axial ends of the conical portion of the plug. 70

3. Plug valve according to Claim 1 or 2, wherein the plug is provided with the said reticulation. 75

4. Plug valve arranged and adapted for use substantially as hereinbefore described and shown in one of the figures of the accompanying drawings. 80

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COMPLETE SPECIFICATION

1 SHEET

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